

10/551589

JC20 Rec'd PET/PTO 30 SEP 2005

1/10/05

## Specification

## Foot Movable Mechanism and Brake in Skating

## Technical Field

5           The present invention relates to, in a sporting gear such as a roller skate or in-line skate, connection of a frame which supports wheels and a shoe or a plate for mounting the shoe, and a brake.

## 10   Background Art

          Conventionally, a shoe or a plate for mounting the shoe, and a frame which supports wheels are connected mainly integrally. As a brake mechanism, one is mainly used in which stationary rubber members are  
15   attached to the front and rear portions of a sporting gear to urge the sporting gear against the ground. Another brake mechanism is also known with which the skater bends his ankle forward or backward to brake.

          With such a sporting gear, particularly a  
20   beginner often loses his balance during skating to fall. Even when the skater loses his balance only slightly, the wheels rotate undesirably and the skater's leg slides forward or backward, leading to a fall. To prevent the fall, the slight loss of balance must be  
25   detected. When the wheels are to rotate whether forward or backward against the skater's will, the rotation must be stopped immediately to prevent the skater from

falling, which is the problem.

#### Disclosure of Invention

In order to solve this problem, according to  
5 the present invention, first, as a multi-shaft mechanism,  
two or more shafts are provided to a shoe or a plate for  
mounting the shoe, or a frame which supports wheels.  
The shoe or plate and the frame are connected to each  
other through the shafts. The mechanism is incorporated  
10 which enables the shoe or plate to move like a pendulum,  
in other words, like a see-saw relative to the frame  
about the shafts as fulcrums.

With the multi-shaft mechanism, the skater can  
lower his two heels simultaneously, or open his legs  
15 apart forward and backward and lower and raise the heels  
of the front and rear legs respectively, to brake with  
the two feet simultaneously.

When the skater raises the heel of his rear  
leg, he may raise the heel to a predetermined angle or  
20 more and then brake, so that he can brake with his  
barycenter being lowered as in the telemark style of ski  
jump.

With the multi-shaft mechanism, preferably,  
the shafts are divided into the front and rear portions  
25 of the foot such that the front shaft is located near  
the ball of the foot or on its front side. Then, the  
skater can raise his heel and strike strongly with the

ball of the foot. Also, stability during skating can be ensured.

The rear shaft is located at such a position that the skater can brake by lowering his heel about the shaft as the fulcrum. Preferably, the rear shaft is  
5 located near the ankle of the foot or on its rear side. Then, stability during skating can be ensured.

A link mechanism, or a belt, chain, wire, or the like is provided to connect and interlock front and  
10 rear brakes with each other. Part of the link mechanism or the like is pushed or pulled by raising and lowering the heel to render the front and rear brakes operative simultaneously.

The mechanism in which the front and rear  
15 brakes are connected to each other by the link mechanism, or by the belt, chain, wire, or the like in this manner so that the front and rear brakes are braked simultaneously will be referred to as a brake interlocking mechanism hereinafter.

20 With the multi-shaft mechanism and brake interlocking mechanism, when the skater loses his balance or intends to brake, he can brake with his two feet simultaneously by lowering or raising his heels.

Even when the brake of one foot wears and does  
25 not work effectively, the skater can brake with the other foot.

In the brake interlocking mechanism, a brake

shoe is urged against the wheels, or drums or disks integral with the wheels, thus enabling braking. The shape of the brake portion is not limited. The brake interlocking mechanism can perform adjustment so that .  
5   braking is rendered operative even with a slight loss in balance or by foot operation.

          In this manner, the front and rear wheels can be braked simultaneously by the brake interlocking mechanism. Thus, all the wheels can be braked, so that  
10   braking can be rendered operative more reliably. The front or rear wheels alone can be braked as a matter of course.

          With the brake interlocking mechanism, the shoe or the plate for mounting the shoe, and the frame  
15   can be connected to each other through one shaft and be functioned. If the shoe or plate is connected and interlocked with part of the brake interlocking mechanism at a position closer to the toe than this one shaft, when the skater lowers his heel about one shaft  
20   as a fulcrum, part of the brake interlocking mechanism can be pulled up at the connecting portion and part of the brake interlocking mechanism can be pushed down by the heel to brake the front and rear wheels simultaneously.

25           In the mechanism in which the front and rear brakes are interlocked with each other by using the belt, chain, or wire, the tension of the brakes to act on the

front and rear wheels, or drums or disks interlocked with the wheels can be easily applied to them evenly. Thus, braking can be performed stably.

Braking can be functioned also when the front  
5 brake is connected to the toe portion of the shoe or the plate for mounting the shoe by using a belt, chain, wire, or the like, and the rear brake is connected to the heel portion. In this case, springs may be incorporated which adjust the tension of the front and rear brakes.

10 With the brake mechanism which uses the belt, chain, or wire, further weight reduction can be achieved.

In this manner, when the multi-shaft mechanism and brake interlocking mechanism are incorporated together, even if the skater loses his balance during  
15 skating, his feet will not slide undesirably but he can maintain his posture. Thus, a very stable sporting gear can be obtained.

#### Brief Description of Drawings

20 Fig. 1: embodiment; a side view of a state during skating

Fig. 2: embodiment; a view showing a state wherein the heel is lowered to brake

#### Explanation on Reference Numerals

25 10: shoe

11: plate from which the shoe can be removed

12: frame

13: front shaft  
 14: rear shaft  
 15: guide groove  
 16: guide groove  
 5 17: shaft  
 18: shaft  
 1A: front wheel  
 1a: rear wheel  
1B: drum  
 10 1b: drum  
 1F: roller  
 1f: roller  
 1N: braking rubber member or brake shoe  
 1n: braking rubber member of brake shoe  
 15 1u: roller for guiding belt 1w  
1w: belt

#### Best Mode for Carrying Out the Invention

An embodiment will be described wherein two  
 20 shafts are attached to a plate, and front and rear  
 brakes are interlocked with each other by using a belt.  
 Regarding Figs. 1 and 2, Fig. 1 is a side view of a  
 state during skating, and Fig. 2 is a side view showing  
 a state wherein the heel of Fig. 1 is lowered to brake.  
 25 Referring to Fig. 1, front and rear brake  
 portions are connected to each other through a belt 1w.  
 The belt is lightly strained.

A shoe 10 has such a shape that it can be mounted on and removed from a plate 11. The plate 11 has shafts 13 and 14 integrally, and rollers 1F at its toe portion and rollers 1f at its heel portion. A frame 12 fixes shafts 17 and 18 of wheels 1A and 1a, and has grooves 15 and 16 to guide the shafts 13 and 14 and rollers 1u to guide the belt 1w.

The shafts 13 and 14 are combined with the grooves 15 and 16 so the frame 12 supports the plate 11.

When two shafts are provided as in this embodiment, the plate 11 can be moved like a pendulum relative to the frame 12. As shown in Fig. 2, when the heel is to be lowered, the shaft 14 serves as a fulcrum, and when the heel is to be raised, the shaft 13 serves as a fulcrum. The plate 11 for mounting the shoe has the rollers 1F in two levels at its front portion and the rollers 1f in two levels at its rear portion. When the heel is raised and lowered, the rollers 1F and 1f pull or push the belt 1w to render the front and rear brakes operative. In Fig. 2, the rollers 1f at the heel portion push the belt 1w and the rollers 1F at the toe portion pull the belt 1w, thus rendering the front and rear brakes operative.

## Industrial Applicability

To use a sporting gear such as a conventional roller skate or in-line skate, advanced techniques and

skills are required. Because of the characteristics of the sporting gear that the wheels freely rotate anytime, it is difficult to adjust the balance while skating. Even to stop motionless at the spot is unstable and  
5 requires sufficient practice.

The present invention solves these drawbacks. When the brake interlocking mechanism according to the present invention is incorporated, anyone can adjust the balance and stop easily without requiring advanced  
10 techniques and skills. A sporting gear is thus provided which can be used by people of a larger number of age groups than before.